CHNOLOGY DEPT:

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLVIII
No. 1246

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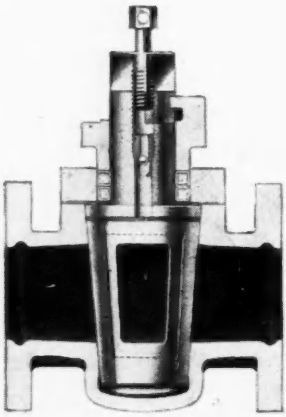

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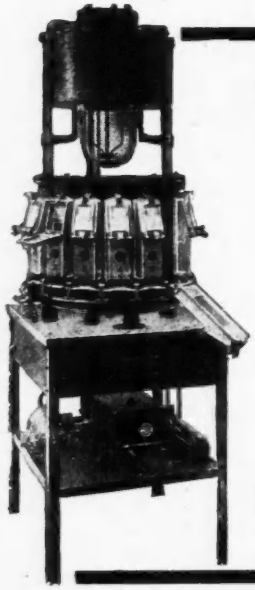

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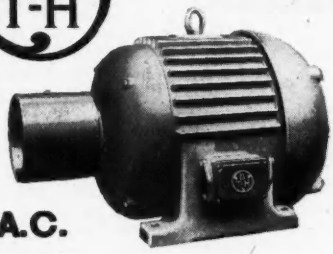

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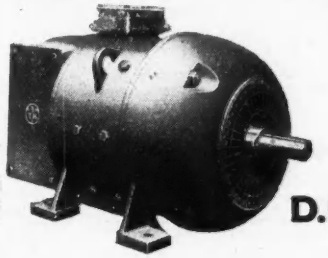

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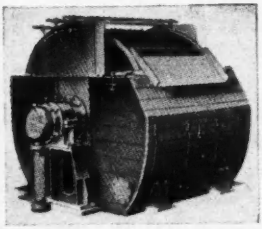

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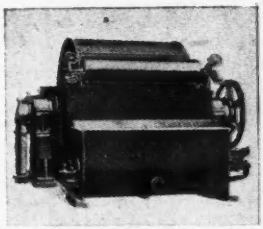

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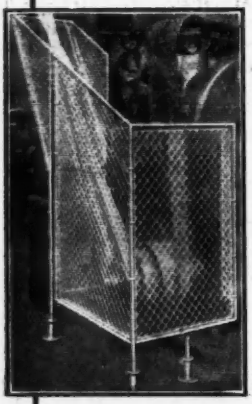

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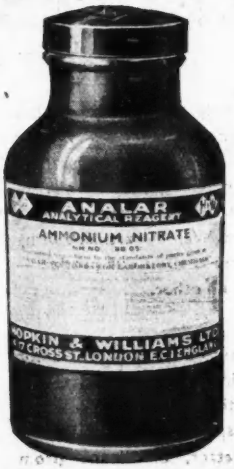

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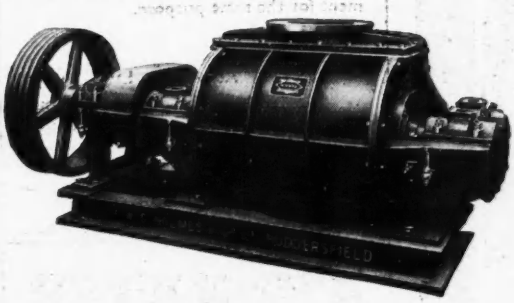

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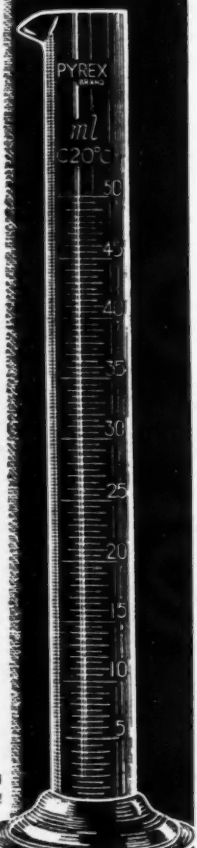

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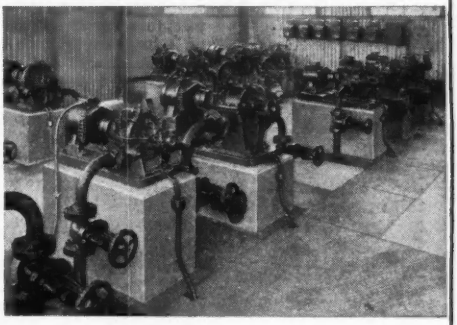

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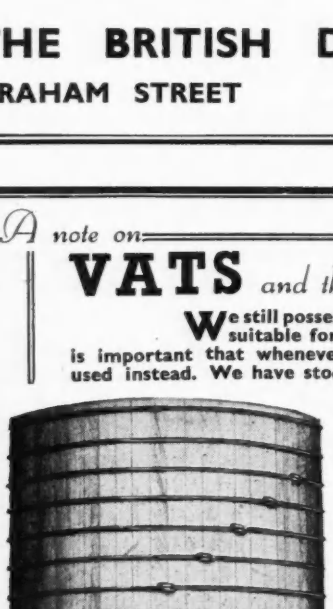

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VOL. XLVIII
No. 1246

May 15, 1943

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The Location of Industry

WE are all getting a little tired of planners and planning. There are certain measures that must be taken to prepare for the post-war conditions—or what we think will be the post-war conditions. There are industries that have not yet moved with the times and must be brought up to date. There are certain large public works schemes, desirable in themselves, that may well be undertaken as an alternative to allowing men to eat the bread of idleness when trade depressions fall upon us. All these are excellent. But having let loose the planners, we shall have to defend ourselves against those who would regiment our lives lest Tennyson's words, "Freedom free to slay herself, dying while we shout her name," come too literally true. Probably the encroachment of the planners on personal freedom can be defeated by the ballot-box, but the real harm will be done when they get busy on fundamentals and meddle with things too deep for their understanding.

Location of industry is one of these things, and it is quite evident from his paper to the Royal Society of Arts that Mr. Glenday (who is the Economic Adviser to the Federation of British Industries) is of the opinion that it is a subject that the planners should leave severely alone. The present location of industry was not, as many people seem to imagine, the result of change or capricious decisions on the part of the owners of works. Even in the earliest years of the rise of industrialism a man did not start a manufactory in a given spot because it was a nice place to live in. Industrialists would not have spent their lives in the Black Country, for example, from choice. Mr. Glenday appears, if we interpret his paper aright, to believe that industry fixed its positions in accord with basic requirements, but with some sort of mass-suggestion. He says there was a common dynamic urge behind all the decisions; "the kind of feeling that when there is a wave of innovation under way the more active and enterprising will feel themselves faced with the choice of either being left behind to be marooned on an island of declining prospects, or of taking the plunge into an unknown sea of change . . . only those who succeed in reaching the shore will be judged to have pursued the proper course—among others to have located themselves properly."

The siting of industrial undertakings has taken place on a background of a five-fold growth of the

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world's population—an altogether unprecedented occurrence—and latterly in accordance with a mass wave of change. The railway age and the motor age each brought changes which entirely altered the range of communications and the mobility of transport and power. Both gave birth to new types of industry, and induced the redirection of old ones into new channels. "Both set in train new waves of growth in output which, after proceeding with increasing acceleration for a time, attained a peak of maturity, whereafter their rates of growth declined sharply." Major subsidiary industries were created or expanded on the tide of the vast purchasing power of the automobile industry, including such giants as petroleum, rubber, glass plate, and steel. An American observer has deduced that in that country an era of buoyant prosperity was generated by the growth of four great industries: street railways, telephones, electric power, and the automobile. When each of the eras of expansion due to these developments came to an end, a wave of depression set in. Economists seem to believe that in America the street car, telephone, and automobile eras had all ended by 1929, while in Britain the end (masked however by war preparations) came in 1937. But for the war we should now be in a deep slump. The essential point of this theory is that with the cessation of the opportunity for territorial expansion, we have entered an age of technological expansion, and that technological developments for expansion spend their force when the market for the products becomes saturated, only replacements being required. It is an interesting theory showing how deeply the modern world is dependent on science and technology for the power to maintain a suitable standard of living. We may ask whether we shall see, as the next movement, the greater dissemination of industry over the world, so that our next wave of development will be devoted to raising the standard of the backward peoples. Mr. Glenday does not deal with this possibility.

The location of industry was fixed by economic considerations. Up to about 1770 industry for the most part was carried on in small workshops or cottages. It was situated among its customers, near its raw material, or near waterways that brought its raw material. Factories were driven into the towns by the Enclosure Acts. The factories were compelled to be placed in and around the few industrial towns, which soon became enormously enlarged. It was lack of transport that created these huge industrial districts, for the less adequate the means of transport, the more closely was industry forced to hug the few places where heavy raw materials, especially coal and iron, and a waterway chanced to coincide. Major changes came with the railways, and with road transport; perhaps a third will come with the aeroplane. It may be possible for employees to live far from their work. To-day, in the London area, a journey of 10 or 20 miles morning and evening is normal and 50 miles is not unusual. To-morrow the aeroplane may enable many of those who work in London to live on the banks of the Severn and those who labour in the industrial South of Scotland to reside in the Highlands, while the Chairman or Managing Director, who is not so closely bound to hours, may prefer the Outer Hebrides. The factor limiting the site of the works will still be the cost of transport—of raw materials before treatment, of semi-finished materials during treatment, and of finished products to the markets. The proximity of electric power will be less important now that the grid is established. The location of industrial gas will also probably be less important since regional gas grids appear likely. Coal transportation cost will still be important, of course. The problem of the future is not so much to determine the location of industry by arbitrary standards as to bring about means whereby total transport costs can be reduced to competitive figures in those areas where it is desired to encourage industrial growth.

We are thus disposed to agree with Mr. Glenday's condemnation of the findings of the Barlow Commission as putting the cart before the horse. It was proposed to set up areas wherein "no additional industrial undertaking could be established without its leave," and it would apparently be the duty of the industrialist to satisfy the Board that the undertaking he proposed to establish could not be conducted on an economic basis elsewhere other than in the area in question. We believe that technological advance will find the answer to the problem.

NOTES AND COMMENTS

Coal Research

THE necessity for planning the scientific usage of the coal resources of Britain is the subject of a report issued by the Parliamentary and Scientific Committee and signed by Lord Samuel, Mr. E. W. Salt, Professor J. A. Crowther, and Mr. M. P. Price. Stressing this country's dependence on coal and the limitations of our coal resources, the report points out that a very small number of scientists—not more than some hundreds in all—are engaged in those forms of research that have a direct bearing on the utilisation of coal, and expresses the opinion that a far higher proportion should be engaged in coal research, in order to contribute substantially to the solution of the economic and social problems that will face us after the war. It is not suggested that the technique of coal research has remained stationary, and full credit is given to the industries and other bodies that have contributed thereto; it is estimated, for example, that while in 1913 only 15 per cent. of the potential energy in coal was turned to account, by 1938 the corresponding percentage was 30. There is still, however, great scope for improvement, especially in view of the fact that there are now industrial installations working with an overall efficiency of 60 per cent.

Where Progress Lags

ENORMOUS possibilities for improvement lie in the industries—metallurgy, glassworking, heavy engineering, etc.—that use high-temperature furnaces and ovens, as these are still working at low efficiency, and in general cannot offer the flexibility and accuracy of control needed for making the fine products called for by the home and export trades. Research into the development of better furnaces for these industries is proceeding, but it is by no means certain that the work is being conducted on a scale proportionate to the magnitude of the problem. Low-temperature carbonisation, hydrogenation and the Fischer-Tropsch process, underground gasification, complete gasification under pressure, and other processes by which liquid and gaseous fuels can be derived from coal are among the matters that should be re-examined and, if possible, developed; knowledge of their economics is of the highest importance. The treatment of coal of varying quality and the examination of the mineral contents of coal ash are other questions demanding consideration.

Coal and the Chemical Industry

COAL must now be regarded as a raw material from which valuable chemicals can be extracted. The chemical treatment of coal must be attacked with all our technical resources. Every branch of our chemical industry is entitled to look to coal to supply its raw material and intermediates. Fertilisers, dyestuffs, plastics, synthetic rubber, soaps, lubricants, and—perhaps most important of all—liquid fuels including high octane spirit for aviation, should be produced from coal. The world's oil reserves being even more limited than those of coal, we must ensure that this country is prepared in time to produce from coal the liquid fuel that we are now consuming so prodigally. Here again, though research of the highest quality is being carried out, far more must still be done to meet even the most pressing needs of a complete programme of coal research. The actual present expenditure on coal research is difficult to estimate. It has been announced that the coal industry, with the assistance of the D.S.I.R., is to spend £200,000 a year on research for the next five years; the gas industry spent some £400,000 per annum before the war on their side of the subject; direct Government expenditure was about £100,000 annually, while the aggregate of expenditure on coal research by the iron and steel and other industries probably did not exceed £25,000 a year. This must be compared with the outlay of £6,000,000 by the American petroleum industry on oil research in 1938; a fivefold expansion in coal research in Britain since 1920 is all that we can show alongside the thirtyfold increase in oil research in America.

Our Future Task

THE recommendations of the committee include the rapid completion of the national coal survey by the Government, and the extension of this to include all sources of energy and carbon compounds: petroleum, lignite, peat, wood, and charcoal. As regards industrial re-

search, it seems certain that many times the present number of scientific workers can ultimately be absorbed and usefully employed in coal research, including the development of transport methods and various types of installation. The cost of such a programme would be high—it is estimated that for every 1000 research workers it will be necessary to provide an annual income of £1,000,000. The report, however, emphasises a fact that is often overlooked, namely that the results of research are cumulative. If the present efficiency of coal utilisation—30 per cent.—can be improved by 1 per cent. per annum, the saving per annum would be one-thirtieth of the expenditure—say £10,000,000 in the second year it would be nearly twice as large, while by the fifteenth year the saving would be at the rate of £100,000,000 a year. Coal research is indeed, as the report claims, an investment which would repay the country handsomely. Expenditure at the full rate cannot be efficiently incurred at once, as it will take time to build up the necessary organisation. The committee urges, however, that no time should be lost in starting. The coal, gas, and electrical industries should be called upon forthwith to submit proposals for a rapid expansion of their research organisations; and such schemes should be generously subsidised by the Government.

Industrial Health

PUBLICATION of the speech made by the Minister of Labour at the first meeting of the Industrial Health Advisory Committee draws attention to certain elementary principles of industrial health which, perhaps because they are elementary, are inclined to be overlooked. Many investigations have been made and a great deal of useful knowledge on this subject has been collected, but insistence upon its application has been lacking. As Mr. Bevin pointed out, much was done in the last war by the Industrial Health Research Board, but in the time between the two wars a good deal of it was lost. The Industrial Health Advisory Committee was appointed to ensure that such useful knowledge is not lost, but applied. Mr. Bevin listed the elementary principles which need to be translated into action. They are few in number, but their importance is in inverse ratio to their number. These factors, which to a large extent are limiting factors in production because they limit the worker's "industrial health," include cleanliness, safety, feeding, and nutrition. The double effect of enabling workpeople to go home clean from their work will be to tend to increase cleanliness in production itself and to prevent the filth of the factories from being taken into the workers' homes. This dirt is at once a cause of unpleasantness, of ill health, and of irritation, especially where people are in contact with all kinds of chemical processes.

Personnel Management

AS Mr. Bevin says, this problem is all a question of facilities and habits, and he hints that where voluntary acceptance of the principle fails compulsion might succeed. He believes that with safety measures, too, we may have to use more compulsion than in the past, and he considers that educational work in this direction still needs to be improved. A great deal of trouble arises from malnutrition, which is not always due to the fact that food is not available; very often the right methods of cooking and feeding have not been adopted. Mr. Bevin welcomes views on this particular subject, on which he has commented on several occasions recently. Another very important factor in promoting industrial health is the contact between the Factory Department of the Ministry of Labour and the personnel management side of factories. Mr. Bevin sees the conflict between the human element and the engineer as a very real one, for the engineer is anxious to get the very last ounce not only out of the machine he has produced, but also from his human "material." He may be an excellent factory manager, but he is not always the best psychologist when taking human reactions into account. The development of personnel management, in which the human factor is balanced against the engineer and the production drive, would have a very marked effect on industrial relations and the general rhythm of our industrial effort. At the end of his speech Mr. Bevin coupled idealism with practice when he remarked that he regarded this work of industrial health and hygiene as one of the best efforts we can make to establish our industrial efficiency, and to regain our status as leaders in the world of sociology and in general industrial conditions.

Modern Concentrated Liquor Plant*

An Outline of the General Arrangements

by LESLIE BIDDULPH-SMITH

POSSIBLY no direct by-product of the coal carbonising industry is affected by war-time conditions more than ammonia, which in peace time is generally fixed by sulphuric acid and used as a fertiliser. In war time, however, not only is ammonia required in the manufacture of explosives, but sulphuric acid is also urgently required for the same purpose, so that while the demand for the former is greatly increased, the supply of the latter is reduced. It is for this reason that the recovery of ammonia as concentrated liquor has recently become so popular and encouraged the author to present the following notes on the working of the very efficient types of plant now available for this purpose.

In the past, quite simple plants were used which concentrated crude liquor to produce up to 15 per cent. ammonia, but, to-day, for a number of reasons, particularly the reduction of bulk for transport, it is desirable to produce a product containing up to 25 per cent. ammonia. Such a process, however, presents problems not met with in the simpler plants, the most important being that ordinary crude ammoniacal liquor is generally a solution of ammonium carbonate containing some bicarbonates and sulphides.

Carbon Dioxide Content

According to the ratio of CO_2 to ammonia, the liquor may be required to be deprived of most of its CO_2 content in order to make it possible to produce an ammonium carbonate and hydrate mixture which will not crystallise in storage on cooling to ordinary atmospheric temperatures. This is generally effected by heating to a predetermined temperature, generally between 80° and 90°C., at which partial dissociation is effected, and by dispersing it over open filling material or over trays in a suitable chamber, known as the dissociator, where the bulk of its acid gas content is evolved and can be withdrawn. Generally, this dissociation involves the simultaneous evolution of some ammonia, and as the rate of dissociation increases the loss of ammonia can become a matter of great importance, considerably affecting the efficiency of the plant, so that such loss must be minimised by careful control of the temperature of the dissociation process, and any ammonia thus passing away must be recovered by washing in a suitable scrubber.

It will be obvious that in cases where the liquor is treated for the recovery of fixed ammonia there will be much less necessity for efficient dissociation, since the concentrated ammonia product will contain only a portion of its equivalent of carbon dioxide. In such modern high-efficiency plants, thermal efficiency is also of major importance, so that heat interchange between condensers, dephlegmator, and preheater must be utilised to the maximum without impairing the simplicity of the plant.

Need for Dephlegmation

Efficient dephlegmation of the gases and vapours has also been found most necessary, since were these products leaving the still all condensed, only a liquor of low ammonia concentration would be obtained. Thus, if the incoming liquor after dissociation contained 1.2 per cent. of ammonia and the steam used in the still was 10 per cent. of the weight of liquor, the total concentration of ammonia would not exceed 12 per cent., whereas 25 per cent. is required. Consequently, a large portion of steam must be condensed by fractional cooling, leaving as much of the ammonia as possible to go forward to the final coolers with the remaining uncondensed steam, the early condensation fraction being returned to the still, so that any ammonia it has dissolved during dephlegmation may be recovered. Condensation in the final coolers is not absolutely complete, and gases pass away consisting of ammonia with small quantities of CO_2 and H_2S, so that it is necessary to recover the former by washing in suitable scrubbers before passing the residual gases to oxide purifiers or to the gas stream of the carbonising plant.

This final washing is usually carried out in two stages: in the first scrubber by means of a portion of the concentrated liquor which is passed through a water cooler and which thus slightly increases its ammonia content in the process. In the second scrubber cold water is used, the weak liquor produced passing to the crude liquor tanks.

The lay-out of a concentrated liquor plant embodying the above arrangements and designed for producing a product containing 25 per cent. ammonia is shown diagrammatically in Fig. 1. Crude liquor is pumped to the feed tank *A*, from which it travels by gravity to the combined liquor pre-heater and vapour dephlegmator *B*, where it is heated to about 85°C. before passing forward to the dissociation chamber, *C*, which it enters at a point about two-thirds of its

* Presented at a meeting of the Northern Section of the Coke Oven Managers' Association on February 24.

height. This chamber is filled with still trays of suitable type for the efficient dispersal of liquor and complete contact with steam.

It is also fitted at the base with a constant-level regulator, one very efficient type of which (shown in detail in Fig. 2) consists of a cast-iron float chamber connected to the base of the dissociator, as shown, by pipes both above and below the liquid level intended to be maintained. By this means the same level is maintained in the float chamber as in the base of the dissociator. In the chamber a steel float is fixed, the moving arm of which protrudes through the casing, being sealed by means of a special gland. This arm, when the level of the liquid rises, directly operates a double-beat valve in the suction line to the pump. Alternatively, the float arm may operate a cam which in turn actuates an air-pilot valve to transmit pressure to a diaphragm operating the double-beat valve. This latter relay system is valuable in cases where the float and double-beat valve cannot be sited in such a manner that a direct link can be made between the two.

Direct steam is admitted at the base of the dissociator and controlled by a constant-temperature regulator to give the constant temperature to the gases and vapours leaving the chamber, so necessary to minimise loss of ammonia. Such a temperature regulator is shown in detail in Fig. 3, the main steam inlet valve being operated by a small pressure relay which admits air pressure to the diaphragm against pressure exerted by a spring or weight, the air pressure in turn being controlled by the temperature in the dissociator head, into which is inserted a thermostatic pressure bulb. The diagram shows an included clock-driven temperature recorder operated by the same thermostatic mechanism.

A small portion of the hot liquor passing from the dephlegmator is cooled in a small water cooler, *C1*, passing thence over the top sections of the dissociator for the purpose of recovering ammonia which would otherwise be lost from the circuit. The gases and vapours leaving the dissociator after this washing are again washed with water in a suitably designed scrubber, *D*. residual gases passing to oxide purifiers or back to the gas stream of the carbonising plant, while the liquor produced is returned

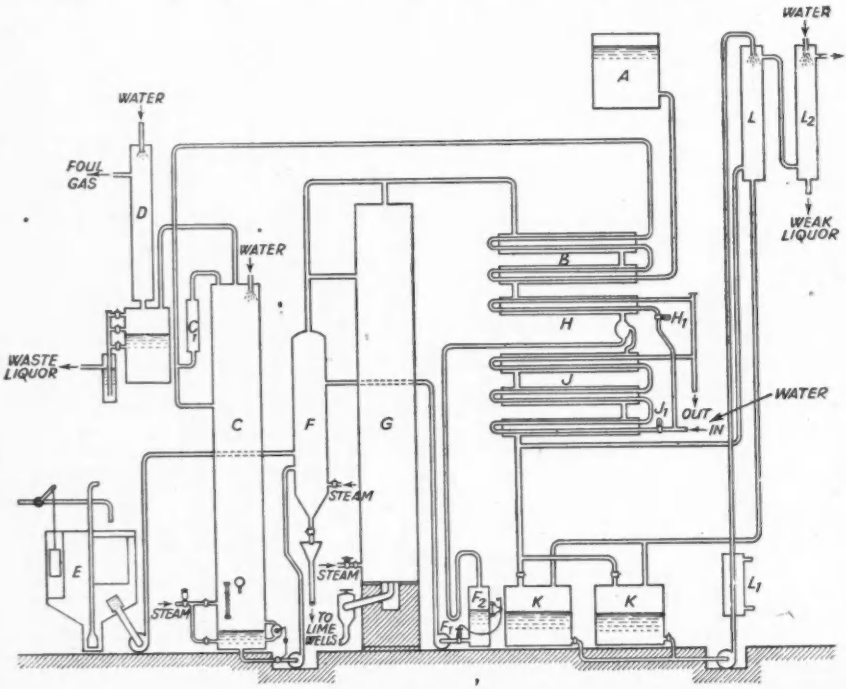

Fig. 1. Concentrated liquor plant (diagrammatic).

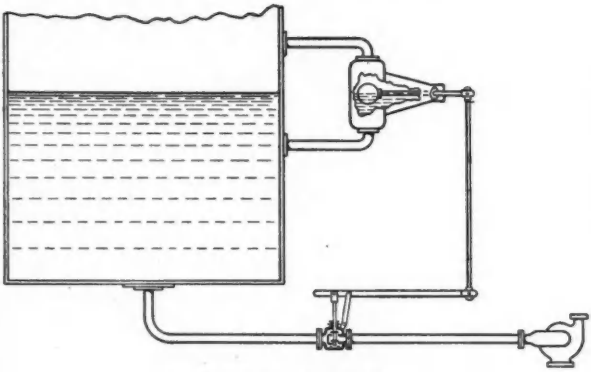

Fig. 2. Level regulator.

to the crude liquor tanks. The dissociated hot liquor is pumped into the lime chamber, *F*, where it meets milk of lime prepared in the standard lime water mixing plant, *E*, and also condensate from the dephlegmator, which has been collected in the balance tank *F*2. Into this chamber high pressure steam is added for the purpose of agitation of the mixture during its passage into the still, *G*, which consists of a series of trays of normal efficient design. Direct steam admitted to the still is controlled by a constant-temperature regulator as in the method adopted for the dissociator.

Constant-level regulation of effluent liquor in the base of the still cannot be maintained as in the case of the dissociator be-

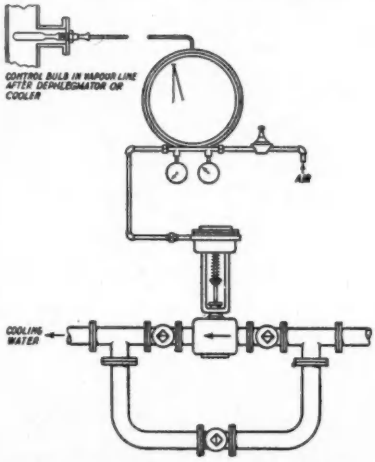

Fig. 3. Temperature regulator.

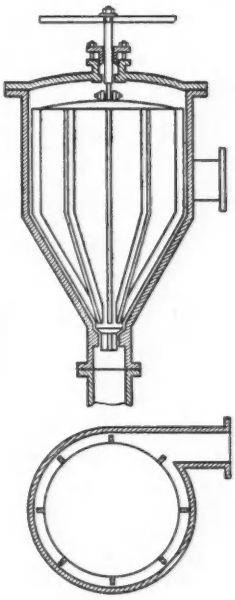

Fig. 4 (right). Float valve.

cause, in this case, of the high percentage of suspended solid bodies, so that another type of regulator, shown in detail in Fig. 4, has been generally adopted. This consists of a float suspended in an annular cast-iron chamber having an outlet on the side for liquor from the still and an outlet in the base containing a valve seat, into which a valve attached to the base of the float fits tighly when the latter descends as the chamber empties. When the level of the liquid rises, the float is lifted and the outlet opens, thus regulating the level at a predetermined height, which, of course, depends on the buoyancy of the float.

Since it is dealing with liquids carrying suspended bodies, in order to keep the float perfectly free the latter is designed with ribs or projections round its vertical periphery, so that the liquor entering at a tangent causes the float to rotate constantly. An outside indicator attached to the control float spindle, which protrudes through a gland at the top of the chamber, indicates the speed of rotation, this being also an indication of the amount of liquid passing.

The vapours and gases leaving the still, pass into the dephlegmator, *B*, which consists of a bank of three tubular coolers, the first two of which are cooled by incoming crude liquor, the third being cooled by water controlled by a constant-temperature

regulator, similar in principle to the one shown in Fig. 3. The condensate obtained is collected in the balance tank, *F2*, fitted with a constant-level regulator as Fig. 2, from which it is pumped by *F1* to the lime chamber, *F*, as described. Final condensation of the gases and vapours leaving the dephlegmator is effected in another similar bank of three tubular condensers cooled by water, the supply of which is regulated by another constant-temperature controller. Concentrated liquor here condensed is led to receiver tanks, *K*, and uncondensed vapours and gases are finally passed to a pair of scrubbers, *L* and *L2*, where any escaping ammonia is recovered.

Liquor from the receiving tanks is cooled in a water cooler, *L1*, and used in the first scrubber, returning later to the receiving tank. Water is used in the final scrubber, the liquor produced passing to the weak liquor tanks and the exit gases passing either to oxide purifiers or to the gas stream of the carbonising plant. Steam and liquor meters are disposed at suitable points about the plant to assist in maintaining general efficiency.

It will be seen that accurate regulation of levels and temperatures is the key-note upon which efficient production of high concentration of ammonia liquor depends, and, it should be emphasised, it is vitally important that suitable regulators of trustworthy make should be employed.

LETTERS TO THE EDITOR

Oil Refining

SIR,—The excellent article on hardened edible oils by Mr. H. R. Mitchell, M.I.Chem.E., in your issue of May 1, has interested us considerably. There is just one point we should like to raise in connection with bleaching by fullers' earth.

In the article it is stated that a combination of fullers' earth No. 1 or No. 2 powder with an active carbon is more generally used than activated bleaching earth alone. It is true that any activated earth does not necessarily give a satisfacory bleach on any oil, but we think that in the great majority of cases the needs of the individual refiner can always be met by a careful selection of the right grade of earth. A good deal of specialised experience is needed in this selection, and this knowledge, which we have in our laboratory, is at the service of edible-oil refiners.—Yours faithfully,

L. H. D. ACLAND,
Assistant Manager,
The Fullers' Earth Union, Ltd.

May 8, 1943.

Misuse of Experts

SIR,—From time to time the Government during the present war has called for expert help, advice or suggestions, particularly when it concerns something which has previously been purchased from abroad, and it is not at all surprising that the call has been met with considerable response. But what has struck me (as no doubt it has many others) is the difficulty facing a small man or men with limited capital. It has been known that experts have given of their time and talents, only to be deprived by people who are ready with money or influence, of the just reward to which they are entitled. Only recently a case has been brought to my notice where a firm of experts reported on certain types of sand which eventually led to large purchases on behalf of the Government. But the official concerned failed to follow the correct course of treating directly with the expert with the result that a company was formed to sell the sand, and the experts, who had given their knowledge, received neither royalties nor payment, but simply were handed out-of-pocket expenses, the total amount of which would be looked upon as pin-money by an ordinary working man today. No doubt had these experts been people of wealth and influence they would have drawn a royalty which would have recompensed them.

The full facts of this particular case were put before the interested Department but they claimed to be unable to do anything. It is worth remembering that the aggrieved parties were experts and might well be useful again, but it is easy to see what would be the result of a further appeal to them for their expert knowledge on a subject on which there are few experts. Surely the Government should foster talent of this description, and it should be their task to see that men are suitably rewarded, and not, as in the case mentioned, simply to utilise the knowledge contributed, and then immediately to cease to show any interest. Harness every horse to the plough by all means, but see the horses are properly fed to continue their work.—Yours faithfully,

P. G. BRISBOURNE.

May 6, 1943.

An extensive post-war chemical industry, developed through the use of great lignite deposits in Manitoba and Saskatchewan and in North and South Dakota, was pictured at the recent research conference in Minneapolis, according to Premier Stuart S. Carson, of Manitoba. He said use of the familiar white poplar of Manitoba as the raw material for rayon and smokeless powder and of chemical gases to ripen fruits were other research projects discussed at the conference.

The Craft of Demolition

Safe Practice with Acetylene and Explosives

by J. LANGLEY

DISMANTLING and demolition is an important commercial activity employing some of the best brains in the country, a fact which is not always realised for the simple reason that it goes on unobserved by the majority of people. Its tempo has been quickened by the needs of war, which demand that obsolete plant be turned into useful scrap. There is no doubt that in the post-war world demolition and dismantling will rank as a major commercial operation, but to-day, this industry must keep its nose to the grindstone and concern itself with projects closely connected with the prosecution of the war. An example of its war-time activities is provided by the dismantling of the airship mooring mast at Cardington, the last link in the annals of British airship aviation. This mast is now being taken down, and the not inconsiderable weight of 350 tons of valuable steel will be added to the country's scrap contributions. The task sounds so very simple, but behind it all there is a lively story of technical skill coupled with wide experience, while to the workmen engaged on the job there is an ever present danger to life and limb. The circumstances under which the work of dismantling it has to be carried out are such that the mast at Cardington cannot be felled either by brute force or the use of an explosive charge. It can only be taken apart, piece by piece, by using oxy-acetylene apparatus. Something like 150,000 cubic feet of oxygen will be expended before the job is completed. It will be a spectacular performance, with the spluttering and hissing blue flame showering a myriad of brilliant sparks in all directions. A casual computation of the amount of oxygen and dissolved acetylene used in demolition would run into millions of cubic feet a year.

In some instances explosives too are used. In one dismantling job a huge piece of plant, including a 24-ton flywheel, was commissioned for removal. This machine was housed in an exceptionally confined space, prohibiting the employment of lifting gear and tackle. To use explosives was the only course left open. The amount of explosive charge had to be scientifically calculated as a minus or plus quantity would have meant either labour in vain or an explosion which would have blown the place to pieces. In the end this flywheel was gently "blown-down" with no more damage than two cracked roof slates!

Those engaged in the dismantling and demolition of industrial plant and machin-

Dismantling the airship mast at Cardington.

ery, like pioneers blazing new trails, are constantly meeting new pitfalls and obstacles. Each dismantling job is a separate entity, has a character all its own, and any two jobs can differ as much as chalk and cheese. Plant and machinery erection has the advantage of blue print information. It is a known quantity. As a case in point a large, badly blitzed warehouse had to be demolished. Its main stanchions were 80 feet high, weighing up to 15 tons each, and encasing a concrete filling, and then another steel upright. Bomb percussions blast in many different ways, so much so that these huge stanchions were literally rocked to their foundations, and yet they remained standing, perfectly upright, and to all intents and purposes safe and sound. But withal there was that formidable unseen enemy of all dismantling jobs—structural weaknesses. Ninety stanchions formed the skeleton of this huge building, with heavy cross girders. The hazards of demolition can be appreciated when it is realised that men had to perch themselves at the top of these stanchions, using oxy-acetylene apparatus to cut away the cross sections, when at any minute the upright might fall crashing to the ground. Hundreds of thousands of cubic feet of oxygen and dissolved acetylene were used and the cost ran into thousands of pounds.

Dismantling without Damage

Often industrial plant has to be dismantled for re-erection. Then every part must be dismantled without the slightest damage, checked up to blue print, railed and dispatched hundreds of miles for another squad to handle. An instance is provided by the following dismantling job. A pre-cooling plant, with steel tubes 30 feet high and 3 feet in diameter, was installed 60 feet above the ground. Men were working 90 feet above the ground carefully removing every single nut and bolt. A simple job, it would seem. But not quite so simple, for it was imperative to avoid damage to the tubes. Moreover, it was essential that each component item be clearly indexed to blue print specification. For a job of this type a very high standard of engineering experience is necessary.

In solving problems of dismantling, the method used must be chosen to meet the complexities of the particular job. These complexities are many. If it is an oxy-acetylene job one must have a clear idea as to the quantity required each day; cylinders must always be on hand. An expert burner can employ his apparatus to cut through great chunks of steel in a few seconds, and a consideration of the steel he can cut in an 8-hour day provides some inkling of the amount of gas he would use in a week.

The photograph shows two members of the squad engaged in dismantling the mooring mast at Cardington. The dangerous nature of their work may be judged from the fact that the men in the photograph are perched 150 feet in the air. Our illustration also makes it clear why the fewer the men engaged on a dismantling job the better. No more than a dozen men were employed in dismantling the mooring mast at Cardington and this crew worked under the personal direction of Mr. Ernest F. Cox, the man who was responsible for raising the German Fleet at Scapa.

Recently the roof of a great railway station in the North of England was commissioned for dismantling. There are well over 100 steel roof trusses, each weighing up to 3 tons. Only the oxy-acetylene apparatus was suitable for this job. Work was carried on while traffic operations continued below, and not one piece could be allowed to drop, either by plan or accidentally. Burners squatted at each end of the truss and started burning through, but before the final cut, a wire bond operated by a steam travelling crane below was attached to the truss which, when free, was gently swung through the air. Without fuss or effort the crane proceeded to deposit its load into a truck for dispatch to the scrap yard.

A particular virtue needed among dismantling crews is infinite patience. A job cannot be hurried out of its normal course of procedure even for a moment; otherwise serious accidents may arise. Much could be written of the work of demolishing and dismantling, but if this article has thrown a new light on the subject and has helped to remove any obscurities it will have achieved its aim.

To-day, the major portion of the steel dismantled is turned immediately into munitions, but to-morrow, when peace is with us again, this work will provide steel for the re-building of Britain.

TRADING WITH THE ENEMY

The Trading with the Enemy (Specified Persons) (Amendment) (No. 6) Order, 1943 (S.R. and O. 1943, No. 642, price 3d.) which came into force on May 10, contains 402 additions to the black list of traders abroad. These include Ferreteria Metalurgica, Necochea 44, Mendoza, Argentina; Laboratorio "Calmette," Carrera 9, 17-63, Bogotà, Colombia; International Laboratories, Inc., Panama City; Corporaçao Mineira Industrial Ltda., Praça da Liberdade 128, Oporto, and Vilar do Pinheiro, Vila do Conde; Fabrica Lusitana de Corantes e Produtos Quimicos (Lusacor), Rua José Falcao 199, Oporto; Laboratorio de Bemfica, Estrada de Bemfica 403, Lisbon; and Cia. Portuguesa do Tungstenio, Av. Antonio Augusto de Aguiar 138, Lisbon.

"An Accident Occurred . . ."

by JOHN CREEVEY

ACCIDENTS, in the chemical industry and elsewhere, do not occur; they happen. Sometimes there is only slight personal injury as a result, sometimes serious injury to more than one person; perhaps a fatality; and possibly material damage to plant and buildings. And accidents when they happen often do so because there has been slight negligence on part of someone, or, unsuspected, certain accident-causing conditions came into existence.

Quite recently there was an explosion at a chemical works, which caused the death of a process worker. Where it was and the nature of the plant need be the concern of none of us. The details which came to light in evidence at the resulting inquest on the dead man, however, can profitably be set down again in print for all of us to read and carry in our thoughts awhile, for the more we are conscious of how accidents happen the quicker will come the time—we hope—when there are repetitions no longer. This particular accident was a repetition of similar circumstances elsewhere in industry, and if records are searched it will be found that such occurrences have been frequent though not always with fatal consequences as in this case.

Mishaps in Series

For some reason—which again is not our concern—it became necessary to shut down two electrically-controlled plant units which were operating on the first floor of a building. Adjoining, there was a switch room, to which access was obtained only by iron stairway outside the building; there was a remote control elsewhere in the building, which was used frequently to avoid the trouble of going to the switch room. When the first plant unit had been shut down everything appeared to be normal, as ascertained by one of the men present, who then went to switch off a compressor. At this point something happened. As soon as he pressed the switch button on the remote control, there were sparks and there was an explosion and debris was flying about, more or less simultaneously. An accident had happened, but as the electric lights had been extinguished by what followed on touching the switch button it was difficult to say what the consequences were. When an electric torch had been procured, it was seen that one of the men was lying more or less unconscious upon the floor, close to a tank from which sulphuric acid was flowing—one of the results of the accident. The man was immediately dragged out of reach of the acid and given attention, eventually being removed by ambulance. At the same time as the acid was seen, it was also noticed that fire had broken out at a point adjoining the switch room, the dividing wall of which had been partly demolished—another result of the accident. When an effort was made to call the fire brigade from the 'phone which was in the building, it was found that the line was "dead"—still another thing for which the accident has to have blame. . . .

Multiple Causes

From evidence given at the inquest, it appeared that the process made use of hydrogen under strong pressure (the compressor has been mentioned), and the plant had been in operation for two or three years without accident. Now, however, an accident had happened, and one with fatal results, injuries to another man, and material damage to equipment and building, while the plant must remain out of use at any rate temporarily.

The cause of the explosion was apparently an accumulation of hydrogen gas which found leakage somewhere on the plant. Better maintenance might have avoided the leakage. We all know that hydrogen mixed with air gives a highly explosive mixture, but often we never suspect how gas from a really tiny leak can accumulate to danger point. The ignition of the mixture of hydrogen and air was caused by a spark; whenever contact is "broken" in an electric switch there is a spark—sometimes a minute spark, or one of the smallest possible duration, according to the efficiency with which the switch operates. If this switch had been an enclosed pattern, of the type that should be installed wherever there are inflammable vapours or gases, the spark would not have mattered, for none of the hydrogen-air mixture would have reached the interior of the switch. Apparently the switch was not an enclosed safety pattern, or if it was it was defective, and so an accident happened.

The verdict of "accidental death" comes as a form of law; medical evidence showed that the man died from burns, shock, and the effect of acid, and that when the explosion happened he also received head injuries from flying debris, for a brick wall had been blown out in the direction where he was found lying. The leakage of acid which caused acid burns, and was a contributing cause of death, came from some point where a gauge was fitted to the acid tank, damage having been done when some of the flying debris struck the tank. Adequate protection for the gauge glass might have prevented the breakage which ensued as a consequence of the explosion; we do not know from the evidence published as to whether or not there was protection against mechanical injury, but we do know that leakage of acid resulted

and the victim had less hopes of recovery as a result.

This little sermon—for a sermon it is—shows how many things enter into the sum total of all that follows when an accident happens. Some of them might have been frustrated by thinking about how equipment, particularly plant accessories, can be obtained in patterns providing a greater degree of safety in operation or from external damage. The switch, the gauge on the tank, the electric lights, the telephone—they all make their bow upon the stage set for human drama. The voice of the call-boy even reminds us that there was no electric torch ready at hand for an emergency, for a man came from outside with a torch when the survivor of the accident, though injured, shouted for help. . . . An accident, which might have been avoided, just happened.

Industrial Safety Gleanings

Purging "Empty" Vessels : Training Safety Officers

EXPERIMENTS have recently been made in America and elsewhere to determine the explosive limits of various inflammable gases and vapours used in industry, and it is now well established that inert gases such as carbon dioxide and nitrogen have the property not only of depressing or narrowing the explosive range of any combustible gas or vapour, but also of preventing the formation of explosive mixtures when these inert gases are mixed in suitable proportions either with the air, or with the combustible gas, or with an explosive mixture of both.

When purging from air to inert gas the object is to reduce the oxygen content of the air in the equipment to such a point that this particular combustible gas may be subsequently introduced without forming an explosive mixture. Experiments conducted by the Consolidated Gas Co., of New York, using nitrogen, showed that the safe condition will be reached when the oxygen content of the atmosphere in the container has been reduced by the introduction of nitrogen to below approximately 8.6 per cent. by volume. Similarly when withdrawing equipment containing this particular mixed gas from service or when purging from combustible to inert gas, the object is to reduce the combustible gas content of the atmosphere in the equipment to such a point that the air may be subsequently introduced without forming an explosive mixture. In this case it is found that a safe condition will be reached when the combustible gas content of the atmosphere in the equipment has been reduced to below about 11 per cent. by volume. Tests shows that carbon dioxide is more effective than nitrogen as an inert gas, since a smaller volume is required to render the given gas non-explosive.

Use of Exhaust Gases

Exhaust gases from motor cars or petrol-driven air compressors are, taken all round, the most satisfactory "purges," since they can usually be made in any establishment. Standard petrol-driven air compressors are better suited for purging operations than car engines, since they may be run under load, thus consuming more fuel and producing a larger volume of inert gas in a given time. The yield of inert gas from an air compressor engine may be estimated at 1000 cu. ft. per gal. of petrol consumed, though with properly adjusted equipment in good operating condition yields in excess of 1200 cu. ft. may be readily obtained.

Tests for Gas Composition

Tests were made to determine the likelihood of producing an inert gas of dangerous composition with extreme carburetter adjustments to the rich and the lean sides, and with one engine cylinder rendered inoperative, in which case the air-petrol mixture to that cylinder passed into the exhaust gas unburned. With the carburetter adjusted to the leanest mixture at which engine running could be maintained against a load of 40 lb. air pressure, the exhaust gas produced contained approximately 10 per cent. carbon dioxide and 7 per cent. oxygen and would not support combustion in any mixture with an inflammable gas of 540 B.Th.U. per cu. ft. when subjected to the action of a spark in an explosion vessel. With the carburetter adjusted to the extreme rich mixture at which engine running could be maintained against the 40 lb. load, the exhaust gas contained as much as 11.7 per cent. carbon monoxide and was explosive when mixed with air in proper proportion. This rich carburetter adjustment was then made progressively leaner, and it was not until the carbon dioxide content of the exhaust gas had been increased to about 10.5 per cent. that it was no longer explosive when mixed with air; showing that a dangerous composition of exhaust gas is produced over a range on the rich side of carburetter adjustment.

Boiler flue gas may also be used for purging, though the combustion process must be carefully controlled to produce inert gas of the required composition. Because of the difficulty in effecting such control, the flue gas from hand-fired solid-fuel boilers should

not be used for purging purposes. In general, the volume of inert gas available within the allotted time of the purging operation should be equal to at least twice the volume of the apparatus to be purged, and the supply must be reliable.

Precautions should be taken to assure that the inert gas flows through all parts of the equipment to be purged. If the operation is interrupted for any reason, precautions should be taken to prevent marked shrinkage of the volume of inert gas in the equipment. This is particularly important in removing equipment from inflammable gas service when the temperature and/or water content of the inert gas are relatively high, for shrinkage in the volume of inert gas may result in drawing air into the equipment, which might be damaged when the vents are closed. Purging with inert gas should be continued until tests show that the oxygen or the inflammable gas content of the purge gas has been reduced to a point of safety. When the safe end-point has been reached, the purge gas may be displaced with either air or inflammable gas as the case may require. When equipment is withdrawn from service, the atmosphere in the equipment should be tested frequently to determine that a safe condition is maintained.

Safety Training Course

The fourth residential training course for safety officers was held at Balliol College, Oxford, from March 29 to April 9: forty-six trainees attended, which is the maximum number if the necessary amount of individual attention is to be given. All the trainees, as at previous courses, were nominated by their firms either because they were already acting as Safety Officers or because they were considered to be in special need of knowledge of accident prevention. In the latter category may be included a works engineer and a certain number of representatives from personnel, labour, welfare and production departments.

The course, like its predecessors, was an outstanding success, as is proved not only by the atmosphere which prevailed during the whole ten days, but by trainees' written comments which were submitted at the end of the course. Such comments are extremely gratifying when it is realised that trainees work practically continuously from 9.30 in the morning until 10 at night.

The course consisted of 22 lectures given by 17 different lecturers. In addition the trainees spent one whole day at the Industrial Museum in London and devoted practically every evening while in Oxford to what are called Problem Sessions, specially devised in order to test trainees' knowledge of lectures that have been given and to train them in reading the law and ascertaining its precise meaning. It is obviously impossible, in a course which lasts only ten days and does actually cover the whole business of accident prevention—technical preventive measures, the law, health and psychological factors, and organisation—to give really detailed instruction on every point. The aim is rather to give trainees a general idea of every aspect of a safety officer's job, to teach them where detailed information may be obtained, to give them enthusiasm and to convince them that what they are taught is the result of accumulated practical experience.

Evidence of the importance attached to these courses by the Factory Department is afforded by the fact that Sir Wilfred Garrett, H.M. Chief Inspector of Factories, was Course Chairman, while Mr. C. Conway Plumbe, H.M. Superintending Inspector of Factories, was vice-chairman.

New Associations

Mica Trade

THE Mica Trade Association, Ltd., has been registered as a company limited by guarantee without share capital. The committee includes Mr. D. B. Scott, of De Clermont and Donner, Mr. M. Berge, a director of Mica and Micanite Supplies, and directors or officials of Langley London, Mica Manufacturing Co., Copeland and Jenkins, Hart Maylard and Co., Hale and Son, Scriven Bros. and Co., Micanite and Insulators, and F. F. Chrestien and Co. The address of the association is 69 Cannon Street, E.C.4.

Internal Combustion Research

The British Internal Combustion Engine Research Association has been registered as a company limited by guarantee without share capital. The council of the Association includes the following companies: Ailsa Craig, W. H. Allen, Sons and Co., Atlantic Engine Co., Bamfords, Belliss and Morcom, Blackstone and Co., Peter Brotherhood, Brush Electrical Engineering, Coventry Climax Engines, Coventry Diesel Engines, Crossley Bros., Crossley-Premier Engines, Davey, Paxman and Co., English Electric Co., John Fowler and Co. (Leeds), General Electric Co., Gleniffer Engines, R. A. Lister, J. and H. McLaren, Mirrlees, Bickerton and Day, National Gas and Oil Engine, F. Perkins, Petters, Robey and Co., John Robson (Shipley), Ruston and Hornsby, Stuart Turner, and Tangyes.

The Peruvian Government has approved free distribution to small farmers of 2000 tons of special salt containing small quantities of iodine, phosphorus, sulphur, lime, copper, and iron to correct prevalent mineral deficiency diseases of cattle.

New Techniques in Organic Chemistry

Spectacular Advances

RECENT progress in organic chemical methods was described by Dr. E. R. H. Jones, of Imperial College, at a meeting of the London and South-Eastern Counties Section of the Institute of Chemistry last month.

The lecturer attributed the spectacular advances of contemporary organic chemistry to the vast improvement in the techniques of isolation, purification, examination, and synthesis of organic compounds. Both new and improved physical and chemical methods have been extensively utilised. It is ever the aim of the organic chemist to employ methods involving the mildest possible conditions and the minimum quantity of material, a trend determined principally by his growing preoccupation with labile compounds of biological importance. The ever-growing petroleum industry has influenced modern distillation technique. Molecular distillation is becoming increasingly popular and has rendered possible the isolation of vitamin A in a crystalline form. Chromatographic analysis has enormously simplified the purification of both naturally occurring and synthetic organic compounds, and has provided a valuable new criterion of purity. On the chemical side a number of new reagents have been developed for the separation of particular classes of organic compounds.

The contribution of microanalysis cannot be over-emphasised and has led inevitably to the universal introduction of micro-methods. Absorption spectroscopy has proved of great service in isolating and determining the structure of vitamins and hormones, and although our knowledge of the relationship between structure and light absorption is still largely empirical, a sufficient fund of information is available to give the method a high diagnostic value.

The discovery of hydrogenation catalysts of the Raney nickel type has made greater selectivity possible, and more specific chemical methods of reduction, *e.g.*, sodium in liquid ammonia, and calcium-ammonia ($Ca(NH_3)_6$), are being continually developed. The Meewein-Ponndorf reaction is of unique value for the reduction of sensitive aldehydes and ketones, and Oppenauer's demonstration that this reaction can be reversed provides a useful means of oxidising unsaturated secondary alcohols to ketones which renders unnecessary the protection of unsaturated linkages. Wide popularity has been accorded to such highly specific oxidising agents as lead tetra-acetate, osmium tetroxide, and selenium dioxide. High-temperature nitration of paraffins and substitution chlorination of olefines are recent technical developments of great significance, and α-methylenic halogenation can now be conveniently effected in the laboratory under mild conditions by employing N-bromosuccinimide. The remarkable orientating effect of organic peroxides on the addition of hydrogen bromide to olefines has led to the discovery of other chain reactions of considerable preparative value which are initiated by these trigger catalysts.

Silica Aerogel

Large-Scale U.S. Production

ACCORDING to *Chemical and Metallurgical Engineering* (1943, *50*, 2, p. 144) the first unit in America for the large-scale production of silica aerogel has recently commenced operations at the Monsanto Chemical plant at Boston, Mass. The product is a light, friable, slightly opalescent solid containing as much as 95 per cent. air volume. Silica aerogels having densities as low as 1.8 lb. per cu. ft. have been produced. The process is built around one essential unit operation involving a unique step, the heating of a gel system to temperatures and pressures above the critical for the liquid phase present in the gel.

The process consists of adding a solution of sodium silicate to sulphuric acid, concentrations being controlled to yield a gel having 8 per cent. silica. After aging several hours to allow the gel to strengthen through syneresis, it is removed from the tank and passed through a roll crusher into one of four wash tanks. Water is passed up through this tank over the gel to remove the sodium sulphate formed in the preparation reaction. When the gel has been sufficiently washed, excess water is removed by draining, and the gel is then covered with alcohol. After a suitable period of soaking the alcohol is drained off and replaced with a fresh supply. The alcohol washing procedure is done by the use of a conventional 4-stage counter-current system. The alcohol is afterwards recovered by fractionation.

When the water in the gel has been substantially replaced by alcohol, the excess alcohol is drained off and the gel heated to 280°C. in an autoclave, the pressure being held to 1150 lb./sq. in. by bleeding off alcohol vapour through the condenser. When 280°C. is reached the pressure is reduced to atmospheric and the autoclave is finally evacuated to 20 in. mercury for 10 min. The autoclave is heated by a jacket containing diphenyl vapour at 80 lb. gauge pressure, this vapour being supplied by an oil-fired diphenyl boiler.

Association of Scientific Workers

President's Address : Annual Council Meeting

THE Association of Scientific Workers held their annual council meeting in London at the St. Martin's School of Art, Charing Cross Road, last week-end. In his presidential address, Sir Robert Watson Watt answered criticisms made recently against the Association. He said they were now strong enough to admit that misunderstandings and misrepresentations existed with regard to the Association, and he thought this admission was now desirable in order to see what the misrepresentations really were and how they could be moved. The assertions made against them were of the following general type: the Association is a body of political scientists (meaning that the members are more political than scientific) and is hunting publicity. "The first charge is partly well founded," Sir Robert commented, "the second is wholly well founded. If in the heat of debate I have denied it, that was a slip of the tongue. We are charged with fostering enmity between junior and senior scientists and disturbing the free relations between scientists and technicians on the one hand, and their benevolent managements on the other. Other critics tell us we are idealists, idealist being a favourite term of abuse.

Criticisms Answered

Sir Robert admitted the charge that they were political scientists. He said that, by definition, politics referred to the influences by which individuals of a state seek to determine or control public policy. Those who believed political scientists were a menace to science and probably to the community had forgotten how fundamental politics really were. They had forgotten that since we are fated to live in a state as individuals, with responsibilities as members of that state transcending our "hobbies," then we are bound, if conscientious citizens, to attempt to exert political influence. "As scientific workers we are concerned with the accumulation and acceptance of knowledge, and as scientific citizens we are profoundly concerned with the application of this accepted knowledge, to the general good of the state and of the world at large. I find it difficult to talk, rationally at least, about the difference of opinion between ourselves and those whom we have called 'the anti-planners'—'the planned sporadicists.' They dislike us because of our not divine but definite discontent. They have devised a dream world in which they can exist without planning, even though planning includes the mechanism by which they receive their salary or wages. I suspect there are few who claim to have the interests of science at heart who would carry their love of science to the limit of wishing that the provision of their wages should become sporadic and unplanned! There cannot be a State without politics and so, as citizens, we are bound to be political, and if we are scientists we are bound to be political scientists. We should reason patiently with these people who think they can get on without considering the impact of politics. I beg them to dig a little further down and admit, with us, that in so far as they have responsibilities to their fellow citizens in addition to their own 'hobbies' and interests they are bound to become political scientists. Then their sense of responsibility will carry them, however regretfully, into the field of publicity hunting. Politics is an attempt to influence public policy. Public opinion can only be *reputedly* influenced by publicity. I am aware there are other ways of influencing public policy, but they are not to be commended."

The Trade Union Side

Sir Robert went on to say that the trade union side of the Association could not be effective without a recognition that the economics of scientific work required the education of their masters and consumers in the enormous dividends to be derived from the fuller development of science. They did not foster enmity between the junior and senior scientists. That enmity did exist to a small but unimportant degree, but he could not accept the suggestion which came mainly from senior scientists that the Association ought to draw a decent veil over that small and dimishing spot of inflammation—their relations with managements. The seniors who had made this quite definite slander on the Association were suffering from that most dangerous of all diseases—contentment—which really meant complacency and often smugness. This most deadly disease of the soul and intellect was difficult to treat, but he invited those who suffered from it to try the Association's form of treatment. There was a half truth in the assertion that they were idealists, for members of the Association believed in the possibility of getting a better country and a better world. "I propose to throw this charge back at our critics, for in their ranks are to be found the really pernicious idealists. They maintain that before the Association existed there was no discord in laboratories. They have a picture of a laboratory which does not coincide with the picture of any laboratory I have ever known. At a meeting with a group of distinguished scientists one research laboratory was represented to us as having ideal relationships between junior and senior, between employee and

management, between the worker at the bench and the worker at the desk. I don't think I was invited to see that laboratory. I am prepared to believe it exists, but as I am not yet ready to go to Heaven, I propose postponing my visit to this laboratory."

Sir Robert was re-elected president. Dr. W. A. Wooster and Dr. S. Masterman remain hon. general secretary and hon. treasurer respectively. This year's executive committee includes eight chemists and consists of the following members: Dr. H. Barron, Mr. R. S. Bickle, Dr. A. H. Bunting, Mrs. P. H. Clarke, Mr. F. A. Crone, Mr. E. A. Holloway, Dr. B. C. Knight, Dr. N. Levy, Dr. D. McClean, Dr. L. de V. Moulds, Dr. C. Ockrent, Mr. E. D. Swann, Mr. E. C. Tubb, Mr. F. H. Wood, and Mr. I. J. S. Williams.

The Annual Report

The annual report, which was adopted, stated that the Association had doubled its membership during the year. There are now 11,132 members who are organised in some 140 branches. The chemical committee reported that a detailed investigation was to take place into salary scales and conditions of employment in the chemical industry. Scales of pay for chemists in Royal Ordnance Factories, the question of redundancy of such chemists and their promotion are the subject of discussions with the Ministry of Supply. So far the Ministry had agreed that for the duration all laboratory assistants who obtain their Inter. B.Sc. will be promoted to the grade of Assistant Grade III. A claim for increases in the salaries of chemists in the Royal Naval propellant factories is still being negotiated. On behalf of scientists in Government employ it is proposed to campaign for the repeal of clause 5 in the Trades Disputes Act, under which no Civil Service organisation can be affiliated to the T.U.C. A resolution was passed that the present wages of unestablished Civil Service scientists should be made to correspond with wages paid in industry.

Over sixty resolutions were before the meeting, and the majority were passed with little discussion. One resolution instructed the executive committee to consider critically the scientific curricula of the universities with a view to determining in what way these could be modified the better to meet industrial requirements. A recommendation was added that the adoption of vacation jobs for science students specialising in industrial requirements should be a permanent feature of their training. One delegate thought this proposal would lead to a dangerous split between industrial and non-industrial scientists, and that any such change in university curricula was impossible with the present depleted teaching staffs. Another speaker foresaw the development of scientists who were no more than manipulators and calculating machines, without any broad understanding of their particular subject. Supporters of the resolution brought several good arguments to bear, maintaining, for instance, that the workshop training included in State bursarships had proved invaluable, and that many suggestions put forward by "pure" scientists proved impracticable in industry. The resolution was eventually carried by a large majority. Another resolution which was adopted urged that employees should be allowed adequate facilities, including time and laboratory facilities, to complete their scientific education. There was some demand that such an arrangement should be compulsory upon employers, since good employers already provided such facilities, whereas bad employers would continue to refuse to do so. It was, however, pointed out by Mr. Ben Smith, the national organiser, that it had been found possible to obtain educational facilities for scientific workers, as a condition of employment, by purely trade union negotiation with individual firms. It was stated by more than one speaker that the Civil Service was one of the worst offenders in not providing educational facilities for their staff. Evening classes were attacked as being a most unequal method of training, evening class students being at an obvious disadvantage.

Use of Foreign Scientists

The utilisation of foreign scientists in the war effort was also discussed. A German refugee made a telling speech in which he argued that the present status of alien scientists was a barrier to their work; if they were allowed to play their full part in Allied war effort it would be a contribution not only to the winning of the war, but also to good international relations after the war. The meeting passed a resolution welcoming the progress which had been made during last year with regard to the use of the skill of foreign scientists in the war effort, but expressing the view that there was still much to be done to secure the most efficient employment of such scientists. Other resolutions which were passed called for the setting up of a Central Planning Board, and the provision of a Central Scientific Appeal Board to deal with specific scientific appointments in view of the unsuitability of the average appeal board to deal with such cases. It was also made clear that the Association favoured the setting up of Joint Production Committees to include representatives of the scientific and technical staff on the workers' side.

Before the meeting closed a telegram was sent to General Alexander congratulating him on the Tunis-Bizerta victories and pledging full support for an Allied offensive this year.

Agricultural Lime

War-Time Demand Increased Tenfold

AT the first joint meeting between the Chemical Engineering Group, the Agriculture Group (Society of Chemical Industry), and the Institution of Chemical Engineers, on May 4, Dr. F. P. Stowell lectured on "The Production and Use of Agricultural Lime." Dr. William Cullen presided. Dr. Stowell began by mentioning that the importance of lime, as expressed in the old maxim "Lime is the key which unlocks the door of the larder," had been realised for very many years. The value of lime lies in the fact that it provides the necessary *p*H to enable bacteria to utilise the organic matter in the soil and convert it into such a form that it can be absorbed by the plant. In addition, it lightens heavy land by flocculation and renders insoluble potash compounds available. Its presence retards the spread of fungoid parasites such as club-root and finger-and-toe disease. It is estimated that an average of half-a-ton of lime is washed out of every acre of cultivated soil each year, and if this is not replaced the soil becomes lime-deficient. Absence of effervescence when the soil is treated with acid is not necessarily an indication that lime deficiency exists; farmers could now obtain accurate sampling of their fields by chemists, by way of agricultural institutions. Over-liming is comparatively rare, but could cause unsatisfactory yields, so that a balance between excess and deficiency should be struck.

Use of Waste Lime

The lecturer dealt with the occurrence of chalk and limestone in Britain, and then proceeded to describe the different methods of quarrying and burning. Prime consideration must be given, he said, to the temperature and length of time the lime is burnt. The more solidly burnt lime had the advantage of being less reactive and, therefore, storing better. Hand picking after burning was still necessary. For agriculture, lime could be applied either as ground chalk, finely powdered limestone, or hydrated lime, of which the first two forms were relatively slow in their action on the soil, and contained less calcium bulk for bulk. With a light soil it was probably best to apply lime in the spring; otherwise it was washed out. For heavy soils the time for application was the autumn, the frost and the lime both helping to break down the soil; its use in spring on heavy soil helped to provide a spring tilth for sowing. Lime, of course, should never be applied with artificial fertilisers such as ammonium sulphate. A ton of burnt lime was equivalent to 26 cwt. of hydrated lime, and 36 cwt. of calcium carbonate. A suitable dressing could be calculated on the basis of one ton of quicklime per acre. Waste lime (the term applied to lime available from certain industrial processes) could be used on the farm if it did not contain injurious substances, but it needed to be dried. In these days, when lime was urgently needed, it was the duty of everyone with waste lime to obtain analyses to find out whether the lime was in a form to be made available to the land, and what the cost of making it available would be.

Acid Soils

Several interesting points were made in the ensuing discussion. Mr. Morley Davies said that over a period of, say, five years, it was estimated that farming would take 20 million tons of lime, which was vital both for arable and for ley farming. It was for the agricultural chemist to give the verdict whether a soil needed lime. Cultivation could be adjusted according to the *p*H of the soil; for instance, it was no good attempting to grow sugar beet or wheat on soil with a *p*H of 4.5, these plants being sensitive to acidity. On the other hand, such land could support potatoes, oats, and rye, which have a "resistance" to acidity. On some land over-liming could immobilise certain elements, such as manganese, and produce a mineral deficiency which was deleterious to plants like oats and sugar beet. To-day, every farmer could have his soil tested free. Lime was difficult to obtain, however. It should be delivered throughout the country at a standard price; some counties were having to pay through the nose because of carriage charges.

Mr. E. F. Mactaggart said there was a need to expand the lime industry in this country, but works could not exist entirely on the production of agricultural lime, as the dividend-earning part of the trade lay in supplying lime for chemical industry. High shaft kilns were not suited to burning chalk, for their use resulted in a mass of crushed chalk which had probably not been burnt at all. The conversion of waste lime into a form suitable for farming was causing many headaches; chemically it was suitable, but not physically.

Mr. E. H. Clark, representing the lime division of the Ministry of Agriculture, said that before the war only 400,000 tons of lime were used a year. During the current year the amount of lime needed was estimated at 4,000,000 tons, including a million tons of burnt lime, and another million of waste lime. War-time conditions made it necessary to urge farmers to spread their demand throughout the year, as many producers were making lime solely for agricultural purposes and would lose their workmen if lime was used only at certain seasons.

Hyglo

Crack Detection for the Workshop

A NEW method of detecting cracks in non-ferrous materials, including all types of plastics, has recently been developed by Messrs. High Grade Metal Tests, Ltd., Marshalsea Road, S.E.1. Demonstrating the new process to a representative of THE CHEMICAL AGE, Dr. Brennan, who perfected it, said it was not a complicated laboratory process but had been developed for use in the shops and on the production line. It is a single process job, requiring no flashing lights, washing tanks, jet sprays, or chalk coverings, as have previous methods of this kind, and unskilled labour can be trained to use it in 30 minutes.

All the equipment needed is a tank (which can be provided in various sizes from a small portable model to one with a base six feet square) fitted with a heater and temperature controller, and a special source of ultra-violet light, arranged to provide only the narrow resonant band necessary to activate the fluorescent material used. The articles to be inspected are placed on a tray and dipped into the tank, which contains a solution of a fluorescent material and a substance which at its boiling point gives off a vapour that quenches fluorescence on the surface. After immersion in the boiling solution, the articles are raised slightly and left for not less than two minutes to dry in the vapour, after which they are removed from the tank, and examined under the ultra-violet lamp, which immediately reveals any cracks, flaws, inclusions, or porosity as brilliant green lines or spots against the dark background of the non-fluorescent parts of the articles. It is emphasised that this effect can be obtained even if the articles are left for a very much longer period after removal from the solution.

Further advantages claimed for the new method are that both the ultra-violet light source and the solution are entirely harmless. The drying agent in the solution prevents all wastage and dripping when the articles are removed from the tank, and, as it only needs replenishing when it falls below the operating level, is self-regenerating, and never becomes contaminated or concentrated, there should be little trouble or expense in that direction. It can, however, be easily replaced when necessary as it contains no controlled or imported solvents.

Left: Articles before treatment.

Below: As seen under ultra-violet light after dipping in solution.

CHEMICAL PUBLICITY

A structural formula as complicated as that of vitamin C has rarely appeared in publicity matter in the lay press, yet Roche Products, Ltd., have dared to include this novel feature in an advertisement now appearing in daily newspapers. The text of the advertisement takes the form of an "editorial" on the much-discussed proposal to set up a national nutrition council. Roche Products editorial comment is "The nutrition council is still in the wishful-thinking stage. If it should ever take on real substance it can look to the organic chemist, labouring in the employ of the pharmaceutical industry, for a willing and helpful collaborator in the promotion of public health and well-being." The firm is to be congratulated on producing this unusual advertisement which is as topical and readable as a newspaper leader.

Corrosion in Petroleum Pipe-Lines

Sodium Nitrite an Effective Inhibitor

INTERNAL corrosion of steel gasoline pipe lines, producing scale and blister of corrosion products, is a serious problem for the American petroleum industry. Mechanical scraping is a palliative measure, tending to increase the rate at which the corrosive action proceeds as removal of scale permits easier access of oxygen to the steel. Sodium nitrite has been tried as a corrosion inhibitor and according to A. Wachter and S. S. Smith, who studied the problem at the Emeryville Laboratories of Shell Development Company, it has been tested in part of a Shell products line with encouraging results (*Ind. Eng. Chem.*, March, 1943, p. 358). It is found effective at concentrations as low as 0.06 per cent. (by weight), inhibiting corrosion not only in new pipes but preventing the further rusting of already rusted steel surfaces in old pipes. The corrosion of steel occurs when it is exposed to water and oxygen, both of which are usually present in a pipe line. Results show that a solution of 0.1 per cent. sodium nitrite prevents rusting at a gasoline/water ratio of at least 200,000 : 1 under conditions simulating some of those in pipe lines. The mechanism of inhibition is at present obscure, but it appears likely that sodium nitrite prevents rust by forming a thin but highly protective film over the surface of the steel. The film is invisible to the naked eye, the steel remaining bright and apparently unchanged even after long immersion in a nitrite solution. The nitrite probably acts predominantly as an anodic type inhibitor with little or no effect on the cathodic reaction of the rusting process. It is considered not unlikely that the protective film formed at the anodic areas consists of ferric oxide.

No Adverse Effects

Sodium nitrite fulfils the condition that an inhibitor must have no adverse effects on the quality of the refined petroleum products which are pumped through the line. Laboratory experiments show that no changes in the properties of common refined products result from contact with sodium nitrite under conditions which in several respects are more severe than are likely to be met with in pipe line operation. Even more convincing is the fact that after operation of a 450-mile-long products line for nearly two years with sodium nitrite inhibition no adverse effect on any product has been observed which could be attributed to the use of the inhibitor.

The authors of the paper report that sodium nitrite is being used successfully for prevention of internal corrosion in three products pipe lines. It has been in use for over two years in a 450-mile line. In a 266-mile line, operated as a crude oil line for about 11 years, its use was started eight months after the line was converted to gasoline transportation about two years ago. In a 90-mile line sodium nitrite has been employed from the start of operations following construction in the early part of 1941. The inhibitor is to be used also in a 1200-mile pipe line recently completed and has recently been started in 370 miles of an old gasoline line. Additional applications are in prospect.

In essence, the application of the inhibitor to gasoline pipe lines involves continuous injection of a 5 to 30 per cent. solution of sodium nitrite at the rate of 5 gallons per day into the pipe at the beginning of each station-to-station length of line. The need for injection at each station on a long line arises from the fact that sediment and water separators are usually built into the end of the section of line bringing gasoline into a station. Since the water at all points in the pipe line must be alkaline for the inhibitor to be effective, sodium hydroxide is added to the inhibitor solution when the *p*H of the effluent water falls below 8.

CANADIAN NICKEL

At the annual meeting of the International Nickel Company of Canada, held recently, Mr. R. C. Stanley, the chairman, said that since the outbreak of war every effort had been made to maintain an uninterrupted output of nickel and to increase the company's mining, smelting, and refining capacity. During the past year production facilities had been strained to the utmost, and essential deliveries of nickel had been made promptly. Owing to increased output, to the accelerated return of nickel-bearing scrap to steel mills, and to the constructive conservation policy adopted by government and industry, the situation had progressively improved in recent months. The company continued to be the world's largest producer of the platinum metals, and the largest producer of copper in the British Empire. Arrangements for the sale of the entire output of these products for British and Canadian war uses had been continued. Accident experience had regrettably not been as favourable in 1942 as in previous years, owing to the fact that labour turnover had been heavy, large numbers of inexperienced workmen had had to be employed, and all the plants had worked at high pressure in order to attain maximum output.

Swiss Aluminium in 1942

Report on Subsidiary Plants

ALUMINIUM-Industrie A.G., the Swiss aluminium company, which owns extensive interests in various countries, reports for 1942 that the extension of the Rhônewerke A.G. has been delayed by shortage of labour, but operations are expected to start this summer. Fluorwerke A.G. has completed its plant at Schweizerhalle, near Basle, and has been operating since the end of 1942. The artificial cryolite produced in that plant is said to be of adequate quality to replace the natural cryolite that is no longer obtainable.

With regard to foreign subsidiaries, the company states that it possessed only superficial information, but no *serious* damage had been suffered. In France, Italy, and Croatia the production of bauxite suffered from labour shortage and transport difficulties. In Rumania and also in Croatia the company is threatened by the nationalisation wishes of the Governments. The alumina plant at Marseilles maintained production approximately in 1941, but only through great efforts. No information is provided with regard to developments in 1942. The extension of the factories is making only slow progress. The finance required has been provided partly by increases in capital and partly by loans from the Swiss holding company. New investments undertaken in order to further increased production of light metals explain the increase in "investments" in the balance-sheet from 53.02 to 68.42 million francs. Considerable sums have been made available for the extension of the plant at Chippis. The gross profit declined to 18.02 (22.71) and the net profit to 10.23 (14.38) million francs, and the dividend is reduced from 12½ to 10 per cent. The company proposes to raise its capital from 75 to 90 million francs.

Italy's Chemical Industries

Montecatini Report for 1942

THE annual report of the Montecatini combine for the past year gives a comprehensive survey of the development of the Italian chemical industries. The company complains that it has suffered at times from a shortage of labour and that prices are largely inadequate. Further efforts have been made to increase the production of electricity and to raise the company's share in the power industry. Special attention was given to plastics, and it is believed that the Montecatini factories will find it possible to compete effectively in the export market after the war.

The subsidiaries have been working well in general. Particular importance attaches to the aluminium interests, where several new technical problems are said to have been solved. Montecatini estimates that the world production of aluminium will exceed 1,500,000 tons before the end of the war. Revolutionary changes have been made in magnesium production methods, at present only on a semi-industrial scale, but construction work is soon to begin on a new magnesium plant. The sales of phosphatic fertilisers depended partly on the raw material position—a phrase which is intended to cover the difficulties of shipping in the Mediterranean; in 1943 Italian rock-phosphate imports are likely to have stopped altogether. The production of nitrogenous fertilisers was maintained at 1938/39 figures. Satisfactory experience has been gained in the use of copper-saving insecticides. It is apparently intended to do entirely without copper for this purpose. It is reported that the supply of chemical raw materials was generally sufficient to cover requirements.

More Pharmaceuticals

In the production of "Nailon" (*i.e.*, nylon) numerous difficulties had to be overcome. In the rayon industry cotton linters have been replaced completely by cellulose products. "Acna," one of Montecatini's subsidiaries, has maintained "the rhythm of production" in the field of dyestuffs and continued research work. The production of pharmaceutical and cosmetic products has increased. Società Farmaceutici Italiana, the Montecatini subsidiary in which Rhône-Poulenc holds an interest, has strengthened its position. In the field of explosives an amalgamation has been carried out by several companies; the new firm is named Dinamite Nobel-Generale. With regard to "Anic" it is merely reported that this subsidiary's installations have been operating. The company was to provide the technical organisation for a national oil industry in accordance with instructions from the Government. Montecatini again distributes 10 per cent. dividend on the old capital of 1600 million lire, since raised to 2000 million lire. The gross profit rose to 472 (409) million lire, but after larger provisions for taxation and depreciation an unchanged net profit is shown.

The Freedom Chemical Company of Canada, Ltd., in affiliation with the Freedom Chemical Company of Cleveland, Ohio, has started manufacturing operations as a new Canadian company at Toronto, turning out permanent-type antifreeze and allied products such as incendiary bomb extinguishers and black-out paints. Installations include agitating tanks and blending and filling equipment, supplemented by a chemical testing laboratory.

Kenya's Mineral Resources

Developing Opportunities for Private Enterprise

AS a result of the activities of the Mining and Geological Department of Kenya not only is the Colony pulling her weight in the war effort, but the foundations are being laid of industries which may well continue after the war. For instance, a company is now being formed to begin the more intensive development of the mica deposits in the Sultan Hamud area. Mica deposits are found in this region, both in the Masai and Machakos Districts. It is hoped that with the expert advice of representatives of the Associated Insulation Products (Africa), Limited, an offshoot of the parent company in Great Britain, the cutting and grading of mica for the market will be undertaken. Production will only be limited by the amount of the labour supply available. It has been decided to start developing that part of the mica-bearing area immediately served by the main Mombasa-Nairobi Railway, and a comparatively large ouput of good uniform mica should now be assured from this source.

Graphite and Asbestos

At Tsavo, about 130 miles from Mombasa, a concession has been given to Kitmag, Ltd., to investigate the possibilities of a low-grade deposit of graphite. Samples are being prepared and if found satisfactory, a test bulk shipment will be made. It is possible that this graphite may be of a suitable quality for the crucible industry, and, if so, it will be in competition with Ceylon and Madagascar, which have been the principal producers of this type of graphite. The large amounts of water necessary for the beneficiation process are available in the Tsavo and Athi rivers. Forty miles further up the railway line from Tsavo milled asbestos is being produced by the Venture Supply Company, Ltd., at Mtito Andei. A new asbestos area in West Suk is to be worked by Manufactures (East Africa), Ltd., who have been experimenting in the production of asbestos boards for the building trade. A pilot plant for this work is being erected at the workshops of Kavirondo Gold Mines, Ltd., which have ceased operating on the production of gold and turned over their workshop facilities to other wartime production. This new development will provide an outlet for a low grade asbestos which is of little value for export purposes, though it has some local value, small quantities being absorbed for "lagging" and insulation purposes. The new workings are about 30 miles from Kitale, and only eight miles from the nearest farm boundary.

When the importation of talc was stopped, so saving about 700 tons of shipping space a year, an opportunity was given for potential producers to supply local needs from local deposits. They have been put in touch with the trade and it is hoped the production of this product will begin in West Suk, South Kavirondo and other parts of the Colony. A small deposit of manganese near Gilgil is being worked by the Mines Department to satisfy local demands in connection with the manufacture of paint. Kyanite also is being mined and used in the local manufacture of high-temperature fire bricks.

A sufficient quantity of arsenical pyrites for the producion of cattle dip and locust poison has been proved to exist and is available for any factory which may be designed to produce these aricles. Macalder Mines, Ltd., South Kavirondo, are prepared to supply the requirements of any such factory. About a thousand tons of sulphur are used every year in Kenya and neighbouring countries, mainly in the sugar industry; this element can be recovered from pyrites which is available in large quantities in the North Kavirondo District. Ample quantities of this ore of a suitable quality have been proved and can be readily obtained whenever the necessary plant to produce sulphur is installed.

Bentonite

The Department is at present investigating bentonitic clays occurring in the Athi River and Timau areas. Such clays are widely employed in the bleaching and clarification of vegetable and mineral oils and, if found suitable, would be a new development of value to the country, especially if export to oil-producing areas in the Persian Gulf could be established. It is the policy of the Mines Department in developing minerals for the market to associate, as far as possible, private enterprise in each endeavour, and to establish any new venture from the outset on a practical and commercial basis. This has been done successfully in the case of asbestos, graphite and mica deposits, and without the retention of the small nucleus of men with mining experience that remains, it would not be possible to carry on the further development of Kenya's other mineral resources.

Possible extraction of aluminium from clay is being investigated by several American concerns including Columbia metals, T.V.A., and the Olin Corporation. Clay is being considered as a raw material owing to the difficulties of getting high grade bauxite from Latin America.

Personal Notes

DEAN C. J. MACKENZIE, acting president of the National Research Council of Canada, has arrived in this country and will confer with British scientists on questions of scientific research connected with the war.

No changes fall to be recorded among the officers of the Plastics Group of the Society of Chemical Industry, except that DR. G. S. WHITBY, immediate past chairman, retires from his position as *ex officio* member of Committee. At the annual meeting on May 11, however, DR. W. G. WEARMOUTH and MR. E. WILKINS were appointed to fill two of the vacancies on the Committee, and PROFESSOR H. MELVILLE and MR. ALAN SPEEDY were elected to the other two. MR. L. W. BLUNDELL, DR. J. O. CUTTER, MR. D. N. DAVIES, and MR. H. LANGWELL retire from membership of Committee.

Obituary

MR. ARTHUR CECIL THOMAS, J.P., until a few years ago chairman of the board of directors of the soap manufacturing firm of J. L. Thomas and Co., Ltd., a subsidiary of Lever Brothers, died at his home in Exeter on May 5, aged 66.

New Control Orders

Export of Chemicals and Machinery

Under the Export of Goods (Control) (No. 5) Order, 1943 (S. R. & O. 1943, No. 650, price 2d.), which comes into force on May 24, control is extended to cover (among other items) additional machinery, metal goods, and chemicals.

Licences will be required to export the following classes of goods to all destinations: Boilers (steam) and boiler furnaces; fuel economisers; pre-heaters; superheaters and de-superheaters; mechanical stokers; driers used for agricultural or horticultural produce; and metal parts and accessories for the foregoing; injectors and ejectors, fluid, wholly or mainly of metal; cellulose acetate; naphtha, wood; and adonitol; aesculin; alanine; arabinose; asparagine; cellobiose; cystine; α-α'-dipyridyl; dulcitol; edestin; erythritol; galactose; glycogen; inositol; inulin; laevulose; litmus and its preparations; maltose; mannitol; mannose; melezitose; melibiose; potassum tellurite; raffinase; rhamnose; salicin; sorbitol; toluidine blue; trehalose; tryptophane; tyrosine; urease; xylose.

Coal-tar products will be grouped together under one main comprehensive heading and, in addition to those at present separately specified in Group 13 of the Schedule of controlled goods, a number of new products become subject to control. The extended list is as follows: anthracene; anthracene oil; benzol and benzene; carbolic acid; coumarone and its liquid polymers; cresols; creosote oil; cresylic acid; high-boiling tar acids; indene and its liquid polymers; naphthalene; naphthas, solvent and heavy; pyridine; quinoline; styrene and its liquid polymers; toluol and toluene; xylol and xylene; mixtures consisting wholly or mainly of one or more of the above.

Licences will be required to export the following: Crucibles wholly or partly of graphite; crushing, grinding, pulverising and shredding machinery, and parts thereof wholly or mainly of metal; machinery of the kinds used for agitating, separating, screening, sifting, sorting or washing mineral products; and mixing machines and parts thereof wholly or mainly of metal; creosote, wood, and mixtures consisting mainly of wood creosote; phenol and mixtures consisting mainly of phenol.

Saccharin and Dulcin

The Minister of Food has amended the Saccharin (Control and Maximum Prices) Order, 1942, so as to prohibit the use of saccharin tablets and sweetening tablets in the manufacture of any product, and the use of other forms of saccharin and dulcin in manufactured foods. An exception is made of the use of saccharin powder, soluble saccharin and saccharin solution in soft drinks. The raw materials for the manufacture of saccharin and dulcin are in short supply, and the purpose of these amendments is to ensure that the limited supplies of tablets are used for domestic purposes; that, with minor exceptions, saccharin is used only for making tablets, soft drinks and pharmaceutical products; and that dulcin is used only for making tablets and non-food products. These provisions come into effect on May 30.

The Order also requires manufacturers of saccharin, soluble saccharin, and dulcin to be licensed, and prohibits purchase or sale by wholesale of saccharin and dulcin in powder form or in solution except against permits. Those provisions will operate from July 25. Exception from the permit machinery is provided where saccharin powder, soluble saccharin, or saccharin solution is obtained or supplied for pharmaceutical purposes (S. R. & O. 1943, No. 669).

Zinc Oxide

The Minister of Supply has made the Control of Non-Ferrous Metals (No. 12) (Copper, Lead and Zinc) Order, 1943 (S. R. & O. 1943, No. 662), which came into force on May 6. This Order increases the maximum prices of the red, green and white seal brands of zinc oxide by £3 2s. 6d. per ton in each case (*see* p. 543) for delivery in lots of not less than 2 tons. An increase in price is necessary to cover the higher costs of production and delivery.

General News—From Week to Week

The new address of Voss Instruments, Ltd., laboratory apparatus manufacturers, is 100 Village Way, London, N.W.10.

The formal opening of the new premises of the British Cast Iron Research Association at Alvechurch, Birmingham, will take place on May 28.

The Association of Scientific Workers have published the proceedings of their "Planning of Science" conference held in January as an illustrated booklet, price 2s. 6d.

The latest Bulletin of the Imperial Institute is a special number to mark the jubilee which fell on May 10. It includes two articles on the scientific and technical departments.

The Prime Minister gave an emphatic "No" in answer to a question in the House from Mr. A. Edwards as to whether he would consider proposing to the United Nations a universal system of measurement, including money, based on the metric system.

The "wasting assets" concession, in respect of E.P.T., for concerns exhausting their reserves in consequence of the war effort has been extended by the Chancellor of the Exchequer to producers of asbestos and mica.

20,000 tons of iron and steel, 500 tons of cast aluminium, and 250 tons of sheet aluminium will be released for industry by the decision of the Ministry of Works to break up a quarter of a million disused motor cars and other vehicles.

Delivering the Mather Lecture at a meeting of the Textile Institute in Manchester last week, Sir Robert Pickard, F.R.S., stated that the application of synthetic plastics to textiles would undoubtedly develop largely in the near future, but he did not believe that the natural products were going to take a back seat, because there was a limit to the amount of raw material which could be used for a specific chemical purpose. There would not be enough to go round.

An interesting film on "Boiler House Practice" has been made by the Ministry of Fuel and Power, and is to be shown to boilermen at works and factories throughout the country. The film is designed to be used in conjunction with a series of lectures, and by making careful use of the advice given in this interesting way, it should be possible to cut down boiler fuel consumption by 25 per cent. The film was also seen by visitors to the Ministry's London conference on the utilisation of steam, heat, and power, on May 12 and 13, a report of which will be included in our next issue.

Total membership of the Plastics Group, Society of Chemical Industry, up to May 1, was 410, a net increase of 28 since the last annual meeting. Actually, the number of new members reached the high figure of 94, but this was offset by the loss of no less than 66 members, largely owing to the correct adjustment of the Group's records with the Society's register.

Powdered pectin exclusively will be used by British jam manufacturers when existing stocks of liquid pectin have been exhausted. To save shipping space only powdered pectin is being imported. The Ministry of Food is making arrangements to obtain trade reactions to powdered pectin, for jam manufacturers have long been used only to the liquid form which is ready for immediate use.

Large quantities of caustic soda in solution in the River North Esk at Dalkeith, Midlothian, are caused by refuse from paper mills. The solution is so strong, according to the burgh sanitary inspector's report, that froth is developed to a depth of five or six feet, and on windy days causes damage to the clothing and footwear of persons crossing a footbridge. So far no remedy has been found.

Five million volumes is the target of books to be recovered from the homes and offices of Londoners during the fortnight, June 5-19. The drive, sponsored by the Ministry of Supply and supported by the Waste Paper Recovery Association, will not be for books only. All the bones, kitchen waste, rubber, rags and scrap metal are wanted. The campaign will be supported by exhibitions at Trafalgar Square and elsewhere.

Discrepancy between vitamin A standards is discussed in *Nature* (1943, *151*, 3836, p. 535). The United States standard, which was originally intended to have the same value as the international unit, is only 2619/3000 of the latter. It is pointed out that the discrepancy in commerce is large enough to be important commercially and it is desirable that its exact nature and magnitude should be recognised.

Foreign News

Canadian chemists are extracting magnesium chloride from asbestos "tailings," of which 20,000 tons are dumped daily.

South African scientists have been able to extract agar from three species of indigenous seaweed, according to a letter in the current issue of *Nature*.

The Argentine Government has authorised the export of up to 100,000 tons of wheat to Spain so long as the latter fulfils her agreed programme of sending iron in exchange.

A potassium permanganate plant with an annual capacity of 36 metric tons is to be erected in Albacete, Spain. In Malaga a plant to produce 100 tons a year of sodium fluosilicate is to be built.

A new concern styled the Companhia Brasileira do Zinco has recently been formed in S. Paulo with a capital of 15,000,000 cruzeiros for the purpose of extracting and processing zinc.

Propylene glycol is to be used in Canada to keep tobacco moist. Cigarette smokers have been complaining about the dry tobacco resulting from the elimination of glycerine, and the absence of Cellophane wrappers for cigarette packets.

A "component scheduling plan" is being considered by the American War Production Board. Under such a scheme components would be directed according to priorities to such industries as synthetic rubber, aluminium, magnesium, and steel.

A new butadiene plant at Baton Rouge (Louisiana), providing raw material for the American synthetic rubber programme is in full production, announces Standard Oil Co. Its capacity is 6600-9000 tons of butadiene a year, according to the quality of petroleum available.

Judging from the fact that the uses of the electron microscope were described among "new research tools" by an R.C.A. expert at the Philadelphia meeting of the Industrial Research Council of America, it seems that this instrument is among the working tools of the well-equipped industrial laboratory.

Deposits of high-grade white mica have been found in Northern Ontario, according to *Electrical News and Engineering* (Toronto), and may replace imports from India, Madagascar, and Ceylon. The use of muscovite or clear phlogopite mica is prohibited in the United States except for priority purposes.

An interesting angle of dehydration is the production in Brazil of dehydrated banana flakes, 80 tons of which were recently sent to British prisoners of war in Germany. The equipment used was originally installed to handle bananas which were too small for export as fresh fruit. Peeled fruit is dried for about 24 hours at 45° C. by hot air and ten tons of bananas can be reduced to 1½ tons.

Production of nitrocellulose from wood pulp in America has increased output by about 25 per cent. wherever it has been used. Development of the new nitrocellulose process is credited to Ralph L. Stern, chemical superintendent at the Parlin plant of Hercules Powder Co. Previous attempts to use wood pulp had resulted in powder of uncertain quality and the old process was slow and expensive.

It is hoped in 1944 to raise Brazil's output of rubber to 75,000 tons from the 1942 figure of 20,000 tons. Rubber planting is stated to be possible in States outside the Amazon Basin, notably Bahia, but it is officially considered unwise to plant on a large scale, since after the war Brazil would have to face competition from Asiatic rubber.

American steel production has been seriously affected by the recent coal strike. According to *Iron Age* the effects of the strike are expected to be felt for some time to come despite the shortness of the stoppage. Steel ingot production, for instance, has already dropped to the lowest level since September.

The leading tungsten producer in Australia is King Island Scheelite N.L., which last year increased production to 242 tons. Test borers have revealed that the mine has reserves of 1,100,000 tons of payable ore, and it has been decided to proceed immediately with the construction of a new concentrating mill to treat 20,000 tons of crude ore a month.

Production of cement on a large scale will be started shortly by the new Argentine company, Cimento Portland Paraná. This is of special importance, as Argentina has prohibited the export of cement produced in factories utilising fuel oil. Last year Brazil imported over 70,000 tons of Argentine cement.

Standard Oil, New Jersey, announce that the first oil cracking plant in the East using the "fluid catalyst" process has started production at Bayway. The development of the "fluid catalyst" is considered one of the outstanding achievements in petroleum technology of recent years. It is utilised in the cracking of petrol to yield high octane spirit.

The new Maspeth aluminium plant, which will be the largest in the U.S. when completed, is about to begin operation of about one-quarter of its units. The plant will be operated by the Aluminum Co. of America, and will eventually employ about 1000 men, reducing aluminium oxide to pure aluminium by an electrolytic process.

Canada's industrial alcohol production from wheat is expected this year to amount to some 14,000,000 gallons from 7,000,000 bushels, against about 1,400,000 gallons last year (when total output of industrial alcohol from all sources was about 5,450,000 gallons), according to a statement by the Dominion Minister of Munitions and Supply. Companies making industrial alcohol from wheat include Amherst Distilleries, British Columbia Distillery, Canadian Industrial Alcohol, Commercial Alcohols, Distillers Corporation, W. and A. Gilbey, Gooderham and Worts, Melchers' Distilleries, Montreal Products Co., Quebec Distillers, Joseph Seagram and Sons, United Distillers, and Hiram Walker and Sons.

Forthcoming Events

Two lectures on " Some New Properties of Inorganic Dusts " will be presented by Professor H. V. A. Briscoe to the **Royal Society of Arts,** on **May 17** and **24,** at 1.45 p.m. They will be illustrated by lantern slides.

The London section of the **Electrodepositors' Technical Society** will meet in the Northampton Polytechnic, Clerkenwell, E.C.1, at 5.30 p.m., on **May 17,** when a paper on "Possibilities of Electro-Deposition from Non-Aqueous Solutions " will be presented by the president, Dr. H. J. T. Ellingham.

A paper summing up the series on " Agriculture To-day and Tomorrow " will be presented by Sir John Russell to the **Royal Society of Arts,** at 1.45 p.m., on **May 19.**

The **Chemical Engineering Group,** Society of Chemical Industry, will hold the annual general meeting and luncheon at 12.30 p.m., on **May 19,** in the Waldorf Hotel, Aldwych.

The **Institute of Chemistry,** London and South-Eastern section, will meet at 30 Russell Square, W.C.1, on **May 19,** at 6 p.m., when Dr. J. W. Cuthbertson will give a lecture on " Recent Advances in the Electro-Metallurgical Industry."

The thirty-third annual May lecture of the **Institute of Metals** will be delivered by Professor G. P. Thomson, D.Sc., F.R.S., at 6 p.m., on **May 19.** The lecture, entitled " Electron Diffraction," will be given in the hall of the Institution of Mechanical Engineers, Storey's Gate, S.W.1.

A London meeting of the **Institute of Fuel** will be held at the Institution of Mechanical Engineers, Storey's Gate, S.W.1, at 5.30 p.m., on **May 20.** Mr. O. W. Roskill will present a paper on " Statistics in the Fuel and Power Industries," to be followed by a discussion.

At a meeting of the London section of the **Oil and Colour Chemists' Association,** to be held at the Charing Cross Hotel, on **May 21,** at 6 p.m., Mr. C. E. Hollis will give a paper on " The Oxidation of Drying Oils."

Company News

Manbré and Garton, Ltd., announce an interim dividend of 5 per cent. (same).

An unchanged dividend for 1942 of 12½ per cent. has been announced by **Stewarts and Lloyds, Ltd.**

The net profit of **Greeff-Chemicals Holdings, Ltd.,** for 1942 was £20,338 (£21,785). As announced last week, a final dividend of 7 per cent. (including bonus) is to be paid.

An interim dividend of 40 per cent. (same), making a total of 120 per cent. (same), has been declared by the **Kolok Manufacturing Co., Ltd.**

The International Nickel Co. of Canada announce the usual quarterly dividend of 50 cents per share.

The final dividend for 1942 of **Babcock and Wilcox, Ltd.,** is again 6 per cent., with a cash bonus of 1 per cent., making the total distribution 11 per cent. (same). The net profit is £623,443 (£616,021).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CHAS. LOWE AND CO. (MANCHESTER), LTD., Reddish, manufacturing chemists. (M., 15/5/43.) April 22, debenture to Mosley Street Nominees, Ltd., securing all moneys due or to become due from the company to Williams Deacon's Bank; general charge. *Nil. March 3, 1942.

SALVOLENE LUBRICANTS, LTD., London, S.E. (M., 15/5/43.) April 27, mortgage, to District Bank, Ltd., securing all moneys due or to become due to the Bank; charged on contract moneys. *Nil. December 31, 1942.

County Court Judgment

INDEPENDENT PLASTICS, LTD., 9, 15 and 33 The Grove, Ealing, manufacturers. (C.C.J., 15/5/43.) £37 16s. 3d. February 15.

Satisfaction

MICHAEL AND JOSEPH WING, LTD., Sheffield, steel manufacturers. (M.S., 15/5/43.) Satisfaction, April 22, of charge registered February 19, 1925.

New Companies Registered

United Essence Industries, Ltd. (380,443).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in fruit essences, essential oils, etc. Subscribers (each with one share): J. Lewin; D. Lewis. Secretary: D. Lewis, 201 Regent Street, W.1.

Grymak, Ltd. (380,253).—Private company. Capital: £5000 in 5000 shares of £1 each. Sheet metal manufacturers, welders, metal workers, colour and chemical manufacturers, glass and plastic manufacturers, etc. Subscribers: Sonia Mason; Nellie Symes. Solicitors: Oscar Mason and Co.,

Cliffords Inn, E.C.4. Registered office: Cliffords Inn, Fleet Street, E.C.4.

Chemical and Allied Stocks and Shares

SENTIMENT in the stock and share markets responded to the war news and, where changed, security values in most sections showed an upward trend. Imperial Chemical were firm and at 38s. 9d. were well maintained on balance, while Borax Consolidated deferred were slightly higher at 34s. 9d. British Match recorded further improvement to 39s., aided by the strong position again shown by the accounts. Imperial Smelting maintained the better level of 14s. 6d., but elsewhere General Refractories showed a further small reaction to 15s. 6d., on consideration of the cautious remarks at the recent meeting. British Oxygen were firm at 77s. 6d.; it was stated in the chairman's speech that the company still has a large programme of extensions and developments to complete. Dunlop Rubber at 35s. 9d. kept most of their recent improvement, awaiting the forthcoming dividend announcement. B. Laporte, whose results are also due shortly, were again quoted at 78s. Elsewhere, Murex were higher at 108s. 9d., and Nairn & Greenwich strengthened to 67s. 6d.

Pending the dividend statement, Allied Ironfounders' shares remained active, and on balance moved up further from 48s. 9d. to 49s. 3d. Various other iron, steel, and kindred securities remained in better request on yield considerations, and Dorman Long were higher at 28s. 9d., compared with 26s. a week ago. United Steel were 9d. better at 27s. Following publication of the results, Babcock & Wilcox were firm at 51s. 6d.; profits improved last year, but the total distribution is again kept at 11 per cent. Hopkinsons' ordinary shares were steady at 61s. on the higher profits and the directors' reference to the increase in the volume of production last year; as previously announced, the distribution on the shares is raised from 15 to 17½ per cent. Stewarts & Lloyds deferred were 52s. 3d. following publication of the full results; Tube Investments at 95s. were 1s. higher on balance. Associated Cement were again 60s., and British Plaster Board 5s. shares maintained their recent rise to 29s. Splintex Glass preference shares remained at the better level of 10s. Key Glassworks were 61s. 3d., while Triplex Glass were slightly higher on balance at 32s. Awaiting the results, due in a few weeks, Forster's Glass 10s. shares were quoted at 27s. 6d. British Tar Products 5s. shares transferred around 10s., British Emulsifiers 2s. shares at 3s. 4½d., while British Lead Mills shares were also 3s. 4½d.

British Glues & Chemicals 4s. shares were 7s. 6d. and, in other directions, Burt Boulton have changed hands at 19s. Business around 17s. 6d. was recorded in British Thermostat 5s. ordinary. Goodlass Wall 10s. ordinary maintained their improved trend, pending declaration of the dividend, and have been dealt in up to 14s. 3d. at the time of writing. Among plastics, British Industrial Plastics 2s. ordinary were again 5s. 10½d., Lacrinoid Products 4s. 4½d., and Erinoid 11s. 6d. Dealings up to 46s. 3d. were shown in Valor ordinary shares. At 29s. United Molasses were better on balance, but the units of the Distillers Co. were easier at 85s. 9d., following their recent rally. At 36s. 6d. Wall Paper Manufacturers deferred units were little changed. Barry & Staines at 41s. 6d. were within 3d. of the level ruling a week ago. British Aluminium (50s.) were also little changed on balance. Awaiting the results, British Drug Houses were quoted at 22s. Elsewhere, Boots Drug 5s. ordinary remained firm at 41s. 6d., and Timothy Whites were again 28s. 10½d., but Sangers moved back slighly to 20s. 10½d.

Turner & Newall maintained an improvement to 77s. 6d., while, in other directions, Pinchin Johnson were better at 34s. on further consideration of the results and the chairman's annual statement. Monsanto Chemicals 5½ per cent. preference were again 22s. 6d. Morgan Crucible first preference showed dealings up to 27s. 6d. Anglo-Iranian and other leading oil shares were better, although sentiment in this section showed little response to the war news.

British Chemical Prices

Market Reports

A SUSTAINED activity has been reported from most sections of the chemical market during the past week and delivery specifications continue to cover good volumes. A steady volume of new business is reported and a strong price position is maintained throughout the market. In the soda products market, chlorate of soda and caustic soda are in good demand, and there is a brisk call for supplies of Glauber salt and salt cake. Good quantities of nitrate of soda are being taken up, while hyposulphite of soda, both technical and photographic grades, are in steady request. Most of the potash chemicals continue in short supply and high prices are being quoted for odd parcels of yellow prussiate of potash. In other directions, formaldehyde is a good market and white powdered arsenic, borax, crude and refined glycerine remain steady and firm. Barium chloride is in good demand. The range of quotations for the lead oxides continues unchanged. Among the coal-tar products, cresylic acid and creosote oil are enjoying a

sustained interest, and the xylols, toluols, and benzols are good markets. Solvent and heavy naphtha remain steady.

MANCHESTER.—Firm price conditions are maintained throughout the Manchester chemical market, and trading conditions during the past week have been satisfactory from the point of view of the general movement of supplies. The textile and other principal users are mostly well covered for forward deliveries under contracts, and specifications are coming forward well, the full range of soda products, as well as all the available potash chemicals, being called for steadily. Carbonate and bicarbonate of ammonia and most other ammonia compounds are also in good demand. Distillers indicate a brisk demand for most of the heavy and light tar products, which are on a very firm price basis.

GLASGOW.—In the Scottish heavy chemical trade there is no actual change during the past week, home business maintaining its steady day to day transactions. Export business is still rather restricted. Prices remain very firm.

Price Changes

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £34; green seal, £33; red seal, £31 10s.

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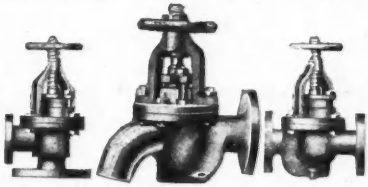

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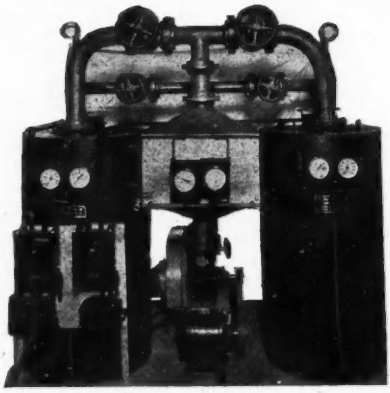

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SITUATION VACANT

None of the advertisements below relates to a woman between 18 and 41 unless such a woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

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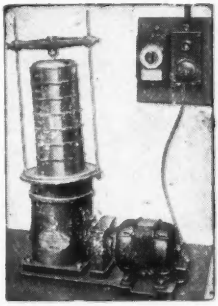

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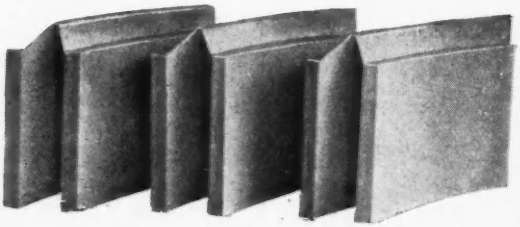

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